Enhancing Subseasonal Temperature Prediction by Bridging a Statistical Model With Dynamical Arctic Oscillation Forecasting

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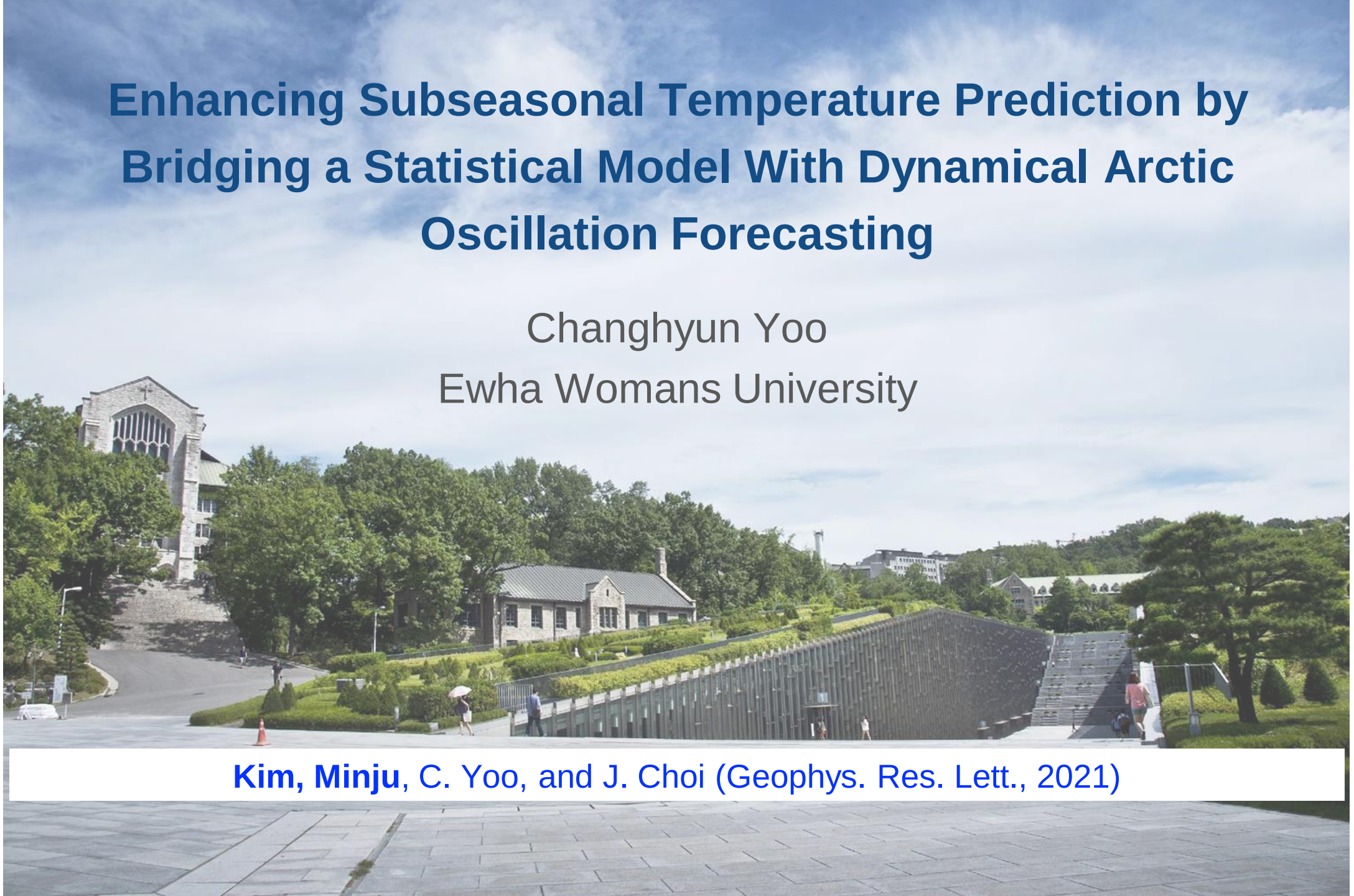
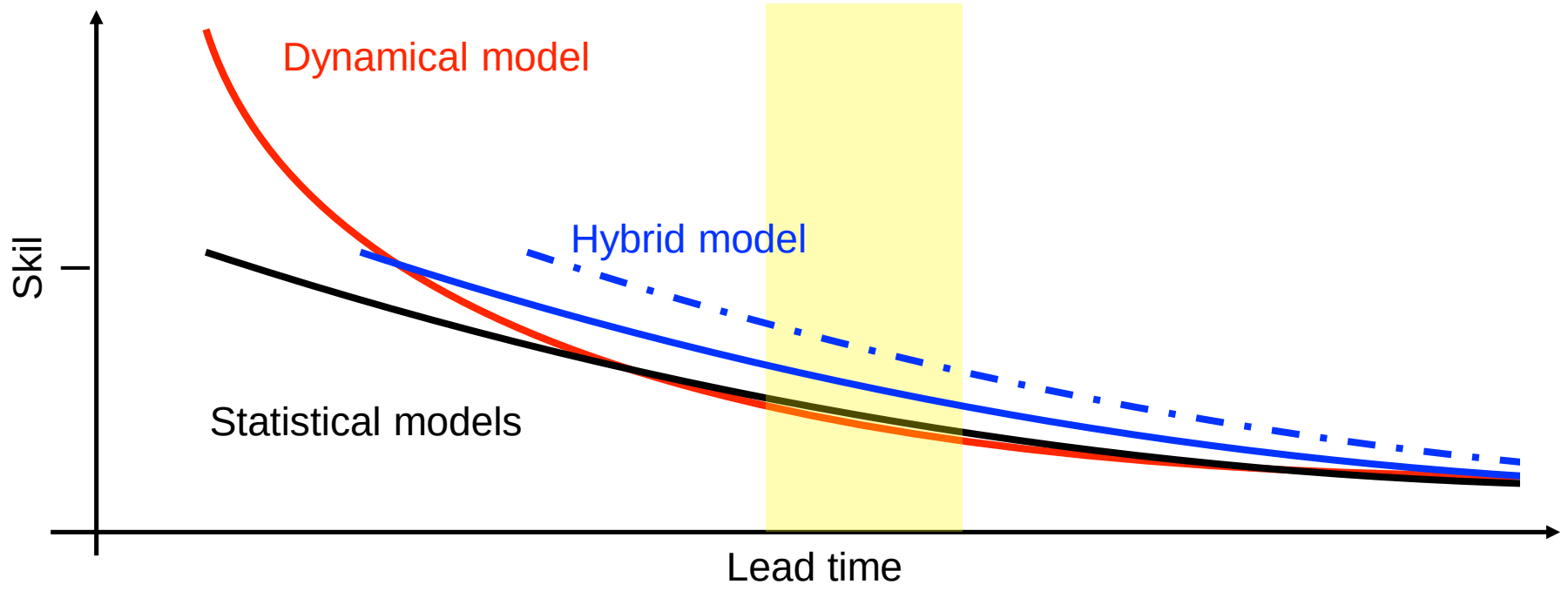


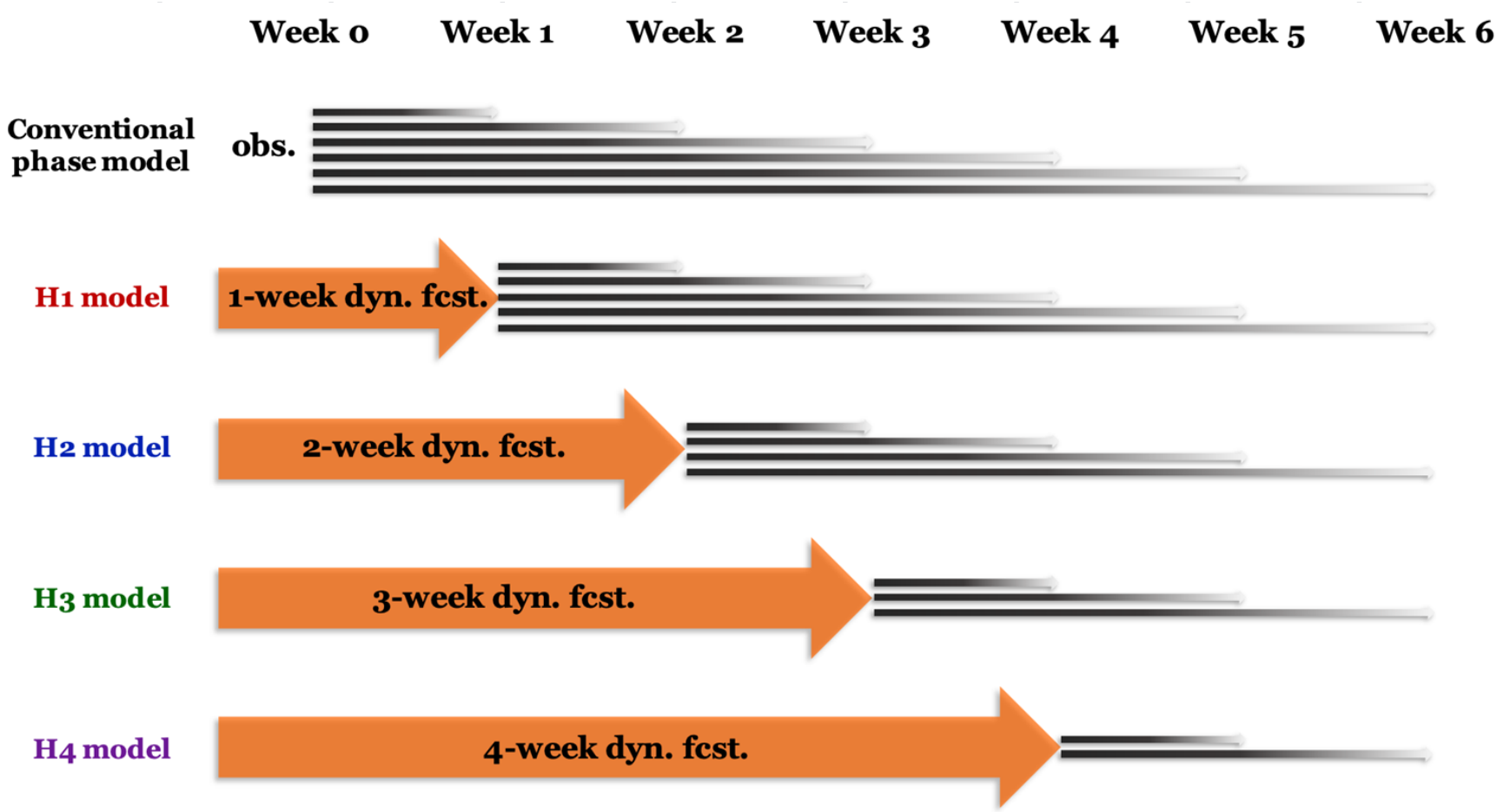
Kim, Minju, C. Yoo, and J. Choi (Geophys. Res. Lett., 2021)

Motivation

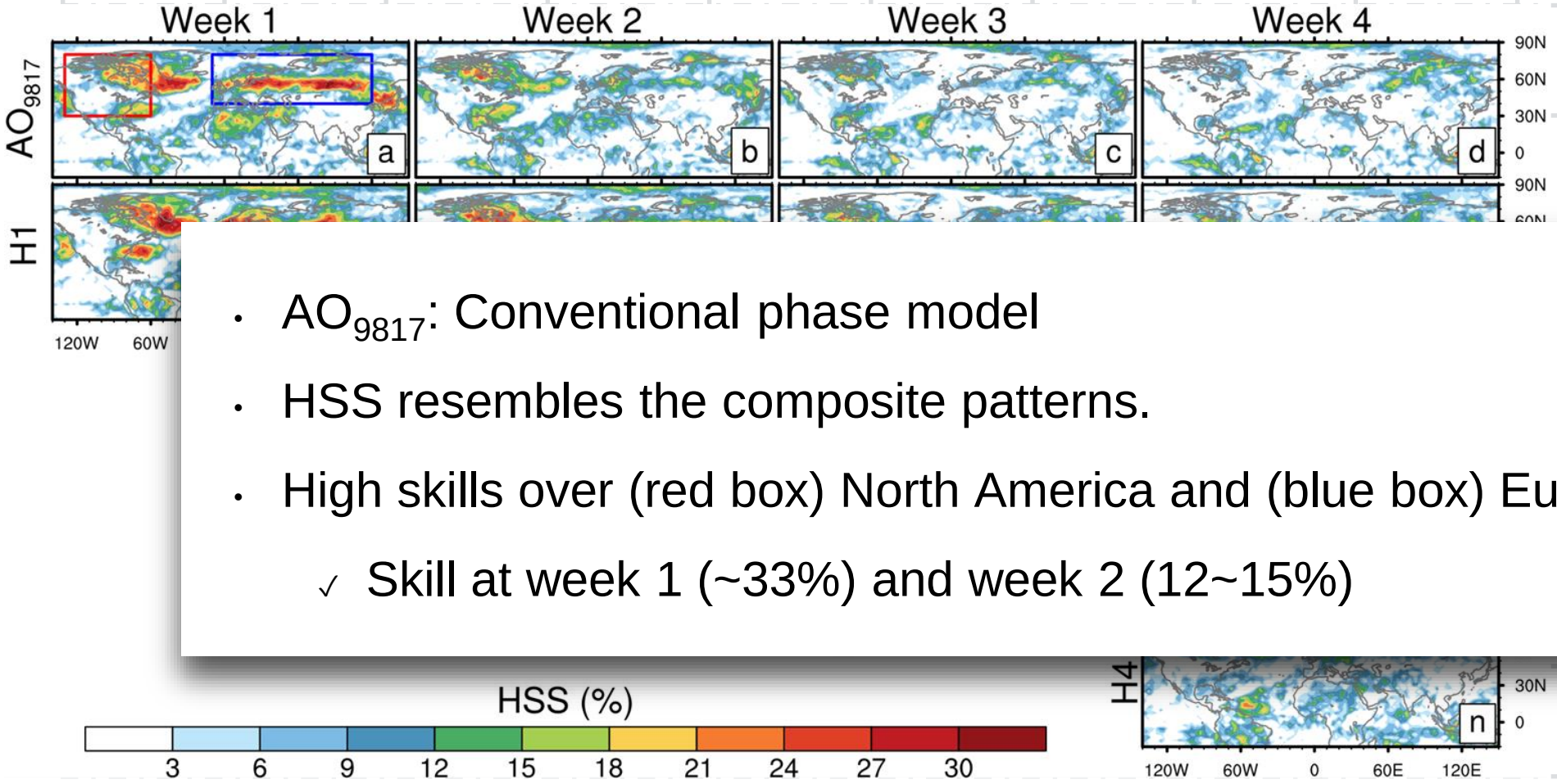


- A lagged composite based statistical forecasting model, or phase model, is one of the statistical guidances of the 3-4 week outlooks.
- The model takes phase information of climate modes only at the moment of the forecast being generated.
  - But dynamical models show reasonable prediction skills of climate modes a few to several weeks ahead.

Procedures of constructing the hybrid phase model

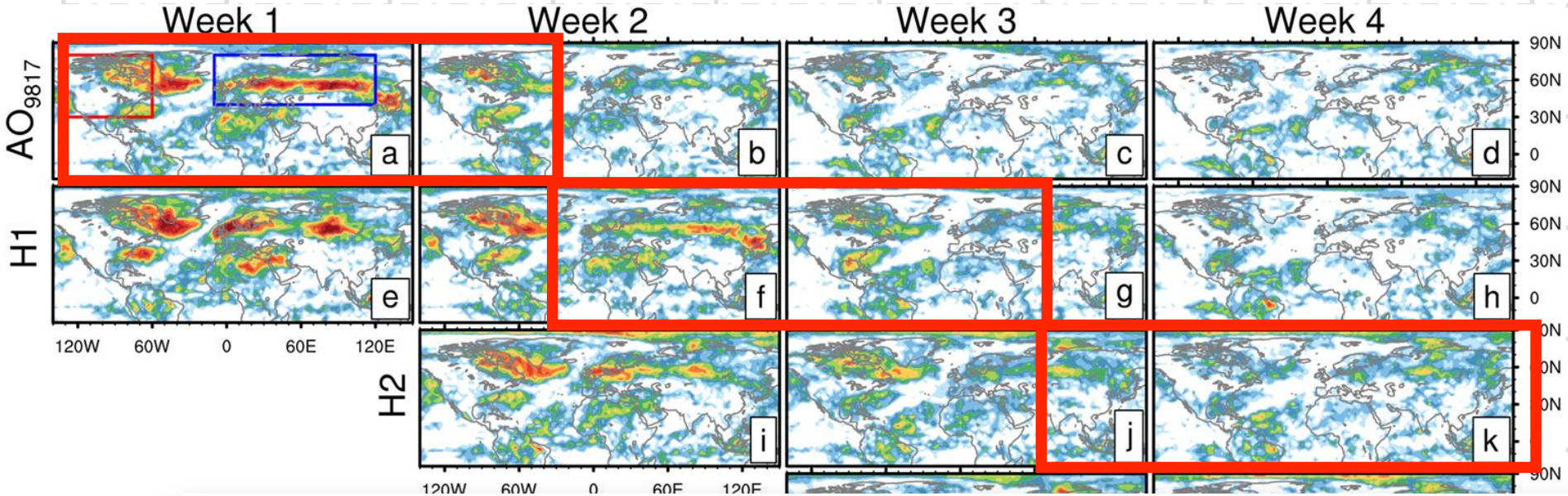


HSS by conventional and hybrid phase models

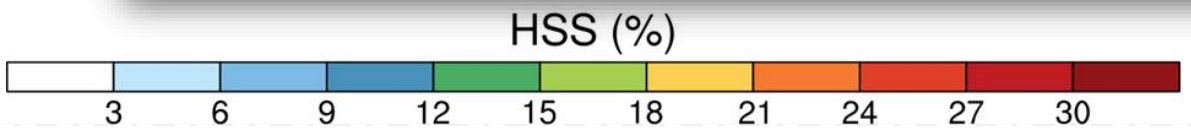


- AO_{9817}: Conventional phase model
- HSS resembles the composite patterns.
- High skills over (red box) North America and (blue box) Eurasia
  - ✓ Skill at week 1 (~33%) and week 2 (12~15%)

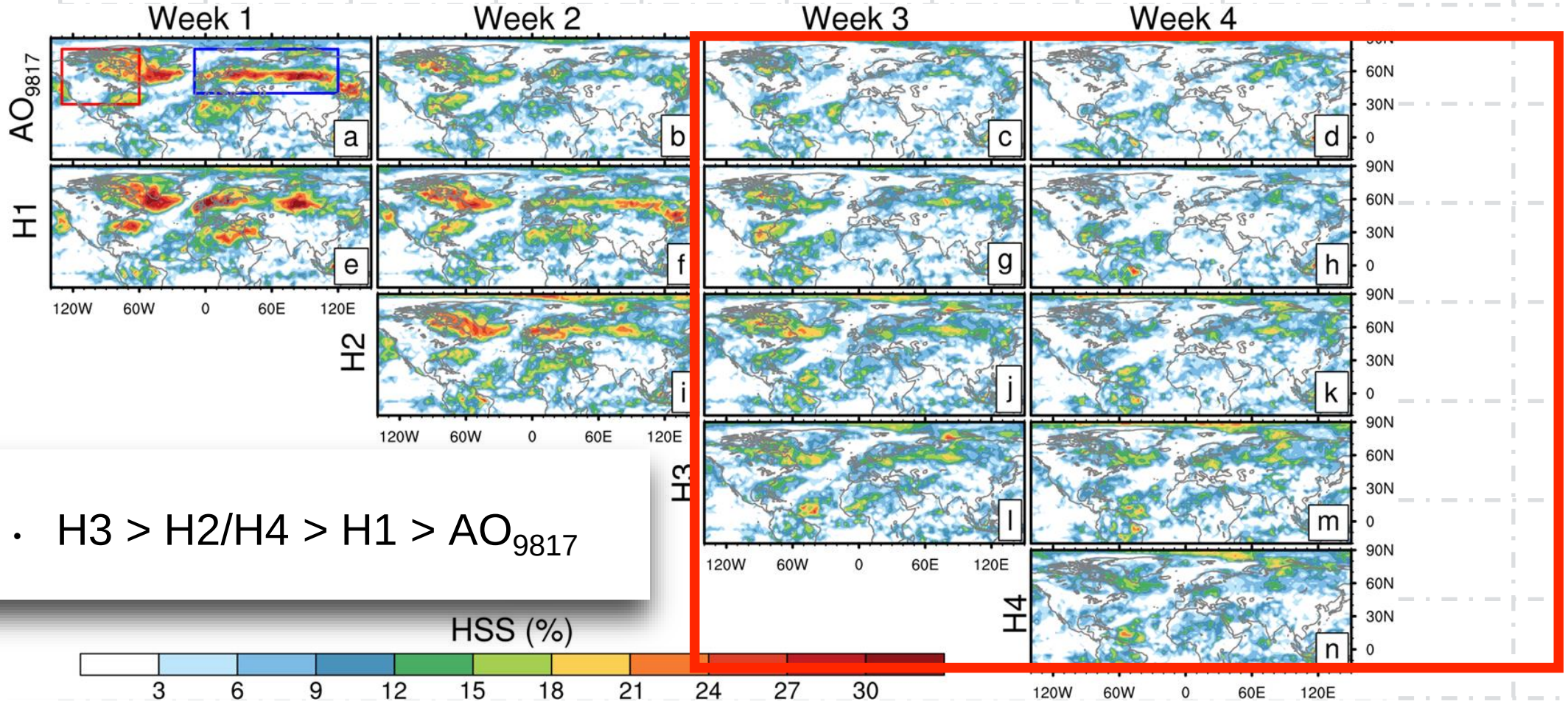
HSS by conventional and hybrid phase models



- (Red) Lagged week 1 relation between AO phase and T2m

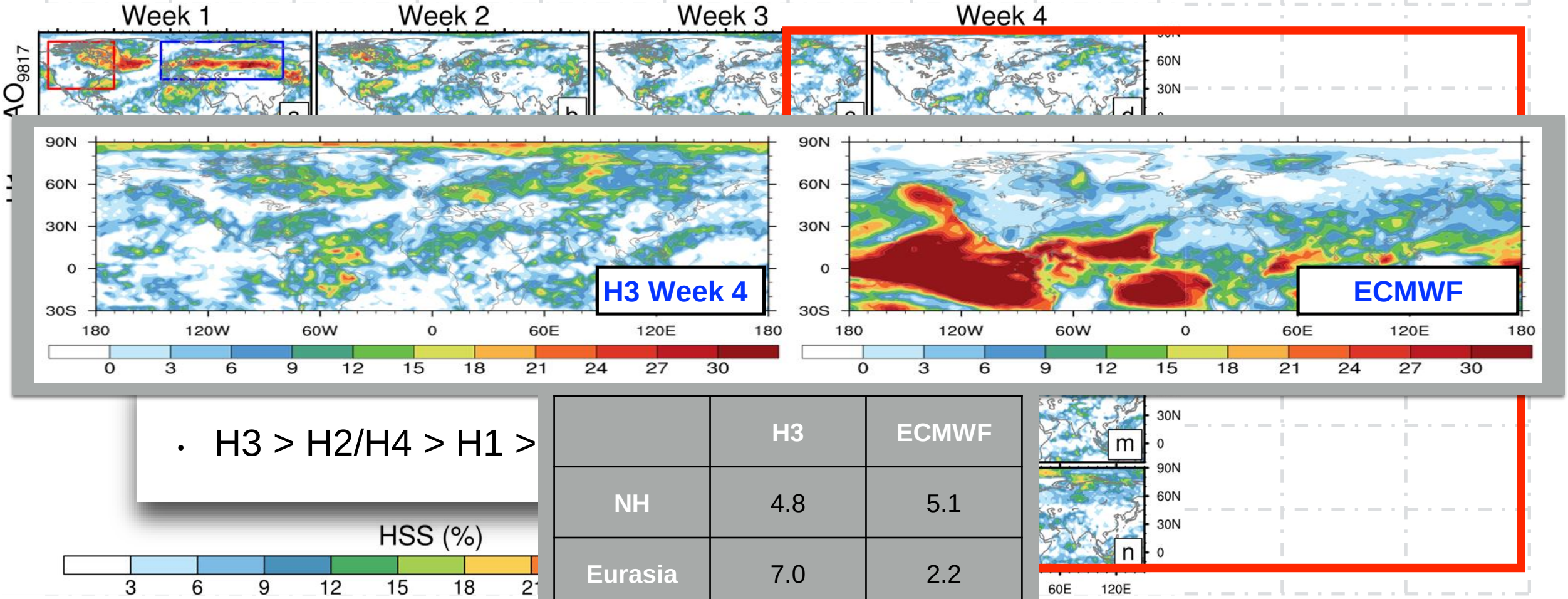


HSS by conventional and hybrid phase models



- H3 > H2/H4 > H1 > AO_{9817}

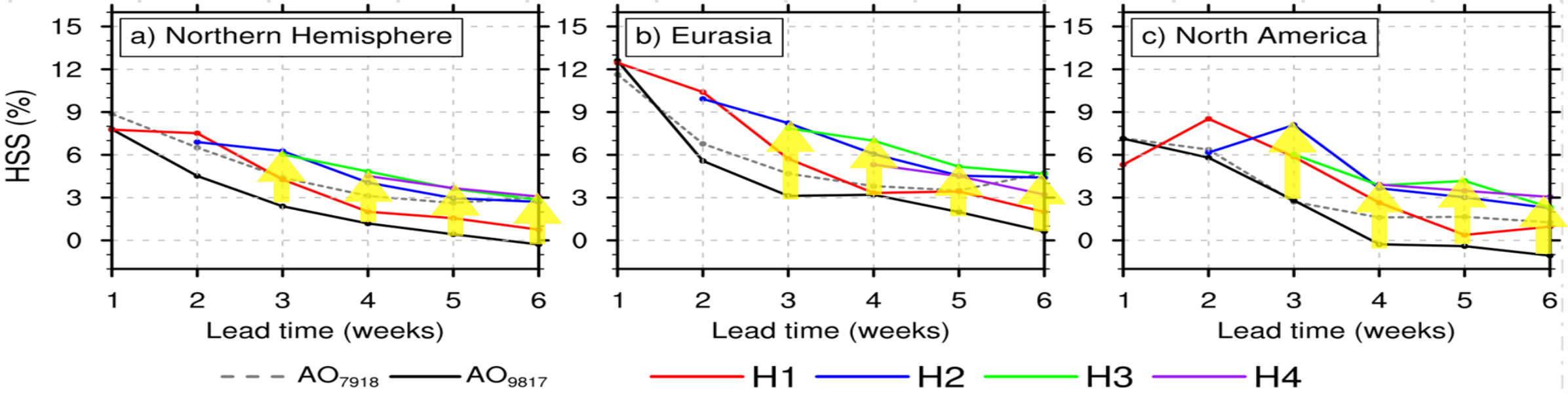
HSS by conventional and hybrid phase models



- H3 > H2/H4 > H1 >

	H3	ECMWF
NH	4.8	5.1
Eurasia	7.0	2.2
NA	3.9	2.2

Domain averaged HSSs



Conclusion

- Compared to the conventional statistical model, the hybrid statistical/ dynamical model exhibited improved skills for weeks 2–6.
  - e.g., H3 for week 3 over the NH land area (6.03%) > AO_{9817} (2.39%).
- The forecast produced by hybrid model H4 was compromised by the lower accuracy of the AO phase prediction.

- The hybrid approach can be applied to other climate modes, such as MJO and ENSO, and to other statistical models, such as a regression model.